THE INCIDENCE OF POST-CATHETERIZATION HEMORRHAGE FOLLOWING TWO METHODS OF NURSING MANAGEMENT

by

Carolyn Elizabeth Sabo

A thesis submitted to the faculty of The University of Utah in partial fulfillment of the requirements for the degree of

Master of Science

College of Nursing

The University of Utah

June 1979

THE UNIVERSITY OF UTAH GRADUATE SCHOOL

SUPERVISORY COMMITTEE APPROVAL

of a thesis submitted by

Carolyn Elizabeth Sabo

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Judith Kiernan Graff, R.N., M.S.
Chairman, Supervisory Committee

I have read this thesis and have found it to be of satisfactory quality for a degree.

R.N., Ph.D.
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ABSTRACT

In this descriptive study, the incidence of hemorrhage following two methods of nursing management (Method A and Method B) was compared. Method A (sandbag) involved placing a pressure dressing and a sandbag on the catheterization site, after removal of the catheter from the femoral artery. Method B (pressure) involved placing manual pressure for 30 minutes on the catheterization site after removal of the catheter from the femoral artery. The population (N = 29) consisted of patients undergoing femoral artery catheterization.

The subjects were managed, after their catheterization, following either nursing management Method A (sandbag) or nursing management Method B (pressure). The catheterization site and any dressing, was observed for evidence of post-catheterization hemorrhage. If bleeding occurred, the time it occurred and surrounding circumstances were recorded.

The major finding was one incident of post-catheterization hemorrhage in Method B (pressure). This did not have any statistical significance and the methods were determined to be equal in terms of patient safety. Method A (sandbag) was determined to be desirable in

terms of potential post-catheterization complications of immobility, cost-effectivness, and management of nursing time.

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CHAPTER I

INTRODUCTION

Use of the femoral artery for introduction of catheters is becoming a common procedure in medical diagnosis and treatment. A variety of complications are possible following this entry into a major artery. Recognized complications at the immediate site of catheter introduction include: embolus formation, ischemia to the leg below the puncture site, and hemorrhage after the catheter is removed (Brunwald, Gortin, McIntosh, Ross, Rudolph & Swan, 1968).

Hemorrhage as a complication of femoral artery catheterization has been addressed. The predisposing circumstances to the hemmorrhage have not been detailed in the literature. Although the incidence of hemorrhage following removal of the catheter from the femoral artery is documented (Brunwald et al., 1968; Berman, deLeuchtenberg, Fishborne & Stunsel, 1972), the specific nursing regimen followed prior to the hemorrhage is not detailed in the reports. Hemorrhage has been acknowledged as a relatively uncommon complication, with life-threatening consequences that must be managed and corrected immediately (Brunwald, et al.

1968, p. 93).

Statement of Problem

In current practice, two entirely different regimens for post-cardiac catheterization nursing management are utilized. The primary difference between the two methods of nursing management include the length of time that manual pressure is maintained on the femoral artery, the presence or absence of a pressure dressing after manual pressure is removed from the femoral artery, and the length of time that the patient is on "bed rest" after the procedure before he is allowed to ambulate. Nurses' consideration of these differences are reflected in the management of nursing time to provide for patient care, and cost-effectiveness implications. Nursing time spent with the patient costs the hospital and the consumer a set amount of money, therefore the consumer is entitled to the maximum amount of care in the least amount of time or the maximum care for the money that he is paying. Since the nurse is responsible for patient care 24 hours a day, he/she has the right to question the physician's post-catheterization management techniques based on available nursing research findings. The nurse also has the responsibility to share pertinent research findings with

professional health collegues.

Hemorrhage, as a cardiac catheterization complication is acknowledged in a number of descriptive research studies (Hall, 1971; Ross, 1968; Swan, 1968). This descriptive study will determine the relative incidence of hemorrhage following two methods of nursing management after femoral artery catheterization. The independent variables of the study are Method A (sandbag) and Method B (pressure). The dependent variables are hemorrhage and no-hemorrhage.

Purpose of Study

This study was conducted because of a concern about why two radically different methods of post-cardiac catheterization management were used. The physician is currently detailing the care to be given the patient following cardiac catheterization. The nurse is responsible for delivering this post-catheterization care and other care to the patient, making post-catheterization management a nursing responsibility. The objectives, therefore, were to improve the quality of patient care by evaluating current management methods following cardiac catheterization.

Implications for Nursing Research

This study will contribute to the general body of scientific nursing research. It will demonstrate that

questioning current nursing practices, testing those practices, and evaluating the test results can lead to improvement in patient care and a body of nursing knowledge based on scientific rationale and not on habit alone.

Review of Literature

A review of the literature reveals many articles discussing the complications of cardiac catheterizations. Hemorrhage as a complication is acknowledged in a number of descriptive research studies (Adams, Fraser & Abrams, 1973; Brunwald, Gortin, McIntosh, Ross, Rudolph & Swan, 1968; Bristow, Seaman, Kloster, Herr & Griswald, 1968; Carter, Girod & Hurwitz, 1975; Hall, 1971; Kirkpatrick, Lakahushi, Petry, Stanton & Lurie, 1970; Lebowitz & Lucia, 1975; Murphy, Piper & Anderson, 1971; Ross, 1968; Shah, Gnoj & Gisher, 1975; Stanger, Heymann, Tarnoff, Hoffman & Rudolph, 1974; Swan, 1968).

The Mayo Clinic conducted a three-year cooperative study on the complications of heart catheterization in 1968. The study was comprised of 12,367 cardiac catheterization procedures that were obtained from two years of data collection. The results of their descriptive study were tabulated on a special form by filling in 25 items of information on each patient

catheterized. This information was collected from 16 contributing laboratories. In this study, 444 major complications occurred, which is an incidence of 3.6%. The incidence of hemorrhage, as a major complication, was .04%. Overall mortality rate, following cardiac catheterization was .45% (Brunwald et al., 1968, p. 93). The large population is the greatest asset of this descriptive study. Although the percentage of patients incurring hemorrhage as a complication is low, it was considered to be a major complication that merited reference.

The results of the study conducted by the Mayo Clinic correspond to studies reported by Kerstein and Ramsby (1973), Adams et al. (1973), and Kirkpatrick et al. (1970), all of which demonstrated a relatively low incidence of hemorrhage as a complication.

During a 16-month period of time, Kerstein et al. (1973) obtained data on a total of 430 male patients undergoing femoral artery cardiac catheterization and found the incidence of complications to be 4.7% (21 cases). There were no deaths in this study. Of these 21 complications, five involved hemmorrhage as a major complication with massive hematoma formation underneath the skin. The largest hematoma was estimated at 750 cubic centimeters (Kerstein et al., 1973, p. 295).

This incidence of hemmorrhage is greater than other studies indicate. Circumstances surrounding the complication of hemorrhage were not discussed.

Adams et al. (1973) did a descriptive study in which they obtained information on 46,900 patients undergoing cardiac catheterization. They obtained this information from 173 contributing laboratories. Adams et al. (1973) collected this data during the years 1970-1971. According to the author's study, hemorrhage occurred at the site of catheter entry in the femoral artery in 0.16% of the cases reported. One case of death, due to hemorrhage, following transfemoral catheterization was reported (Adams et al., 1973, pp. 609, 611).

Kirkpatrick et al. (1970) collected data on children undergoing cardiac catheterization. They obtained information on 148 patients during an eight-month period. Ages of the children ranged from one day to 16 years. Kirkpatrick et al. (1970) also showed an overall complication incidence of 4.7%. The authors stated that hemorrhage did not occur as a complication in this study, however, post-cardiac catheterization hemorrhage has occured in four or five instances in the laboratory in which the authors conducted their study. According to the author's experience, the hemorrhage always occurred within the first hour after the removal of the catheter and

the hemorrhage was managed by manual compression of the artery (Kirpatrick et al., 1970, p. 1054).

Carter et al. (1975) conducted a descriptive study among neonates undergoing cardiac catheterization from January 1968 through April 1971. During this time the authors collected data on a total of 390 neonates. Manual pressure to the catheter site was initiated, however, specific time interval and method was not mentioned. Two instances of bleeding did occur, which were alleviated by pressure at the catheterization site (Carter et al., 1975, pp. 662-663).

Eight case reports of cardiac catheterization, using the femoral artery, were reported by Hall (1971). In these eight case reports, three showed hemorrhage as a complication of the catheterization. According to Hall, the most frequent complication of cardiac catheterization is bleeding and resultant arterial thrombosis at the puncture site. He described the thrombosis complication as a consequence of sustained heavy compression to arrest hemorrhage from the site of arterial puncture (Hall, 1971).

In a descriptive study conducted by Lebowitz et al. in 1974, a population of 1,250 patients were observed during and following cardiac catheterization to determine possible complications. Total complications within this population was 36, with 14 complications being due

to delayed bleeding from the femoral artery puncture site. Bleeding was determined to be the most frequent local complication of cardiac catheterization. Lebowitz et al. (1974) collected data during cardiac catheterizations which they were directly supervising (Lebowitz et al., 1975, p. 546).

During a four-year period, Shah et al. (1975) conducted a descriptive study on 377 coronary artery catheterizations. During Shah's et al. (1975) study, three patients, or an incidence of 0.85% hemorrhaged and also developed femoral artery thrombosis secondary to the hemorrhage (Shah et al., 1975, pp. 353-355). From this study it would appear that hemorrhage may also contribute to other serious complications.

Finally, a study was done by Stanger et al. (1974) at the University of California Medical Center, San Francisco, California. They collected information on 1,160 neonates, infants, and children who underwent cardiac catheterizations at the University Medical Center during a three-year period. Stanger et al. (1974) stated that although small blood losses were common during the catheterization procedure, large blood losses were infrequent (definitions of small and large amounts were not included in the report). Blood losses sufficient to require transfusion occurred in six patients and no blood losses were sufficient to require

surgical intervention. Stanger's et all (1974) study does not describe the overall number of patients who developed hemorrhage as a complication, since blood loss was insufficient to require transfusion (Stanger, et al., 1974, pp. 595-597).

Parrish (1977), a thoracic surgeon, stated that he utilized the Method B regimen of digital pressure and bed rest only on the premise that pressure to a bleeding artery is a proven surgical technique to stop hemorrhage. He also stated that this method was the only one that allowed for definitive control over the artery. Parrish has been utilizing this method of post-catheterization nursing management for 20 years and did not offer statistics on the occurrence of complications in his patients. (see page 29 for description of Method B.)

Anticipatory nursing care following cardiac catheterization has been described by Lamberton (1971). Lamberton does not describe an incidence of hemorrhage following catheterization of the femoral artery or her experience in management of this complication. She does state that one of the major nursing responsibilities of the post-cardiac catheterization patient is to check the patient's dressing for bleeding or an underlying hematoma that may have formed after the catheterization (Lamberton, 1971, p. 1720). In this article, Lamberton

is assuming that a particular method of post-catheterization nursing management is being followed and that hemorrhage is a definite possibility.

The primary limitation of the reports in the literature is that the studies tend to be descriptive in nature with none being either experimental or quasi-experimental. Therefore, there was no control group in any of the studies. An experimental design utilizing a control group is not feasible in view of patient safety. A control group would be one in which no treatment was given, after removal of the catheter from the femoral artery, to control bleeding. Validation was demonstrated in all of the studies, in that hemorrhage was acknowledged as a complication that was potentially life-threatening to the post-cardiac catheterization patient.

The literature described hemorrhage as a complication of cardiac catheterization via the femoral artery. There were no discussions in the reviewed reports concerning the point in time that hemorrhage occurred after the removal of the catheter. No predisposing factors to hemorrhage such as early ambulation, heparin therapy (during the catheterization procedure), or a history of hypertension were noted. Case reports did not include the method of post-catheterization nursing management.

This descriptive study will measure time in addition to hemorrhage. The time that the nurse spends with each patient is valuable, costing the hospital and ultimately the patient money. Schultz and Johnson (1976) stated that the individual should be given maximum effectiveness from services, while conserving his resources of funds and time. There is an increased need to make managerial decisions on the basis of cost-effectiveness implications, based on a comparison of alternative actions. According to Schultz et al. (1976), there have been few incentives to contain costs within the hospital organization, because increases in hospital costs are passed onto insurance companies and other third-party payers. This passage of costs ultimately reach the consumer who must pay for these hospital cost increases. Medical and surgical nursing service represents 20-25% of total hospital costs, therefore the nursing service personnel are more vulnerable to charges of waste and duplication of services (Schultz et al., 1976, p. 97). According to Schultz et al., there is growing evidence that a great deal could be done to control costs of nursing service more effectively.

Ward (1975) maintained that cost-effective analysis must consider the element of time. Ward stated that the primary approach to cost-effectiveness analysis is to

estimate the monetary value of benefits with the cost of the proposed health care. This monetary value will have time as a primary component.

Theoretical Framework

The process of blood clot formation is essential to an understanding of how entry of a foreign body into the femoral artery can lead to hemorrhage. Clot formation occurs in three stages: vascular spasm, formation of the platelet plug, and clotting in the ruptured vessel (Guyton, 1971, p. 136). Blood loss from a ruptured vessel will not stop until the platelet plug is secure, and this temporary seal is unstable until the clot is formed. In the femoral artery, the pressure is sufficiently high (greater than 70 millimeters of Mercury) that vascular spasm alone will not slow the flow of blood down enough for the platelet plug to form (Guyton, 1971, p. 136). The pressure applied during nursing management should be sufficient to slow blood flow, but not to occlude the artery. This pressure is variable between individuals depending upon their systolic blood pressure. Other factors which contribute to clot formation include: the diameter of the hole in the vessel and the trauma to the vessel that occurred with the catheter removal.

Vascular spasm occurs immediately after a blood

vessel is ruptured, stimulating the wall of the vessel to contract. This instantaneously decreases the flow of blood from the rupture.

Platelets are the breakdown products of megakaryocytes, large granulocytic cells formed in the bone marrow. The megakaryocytes disintegrate into platelets while still in the bone marrow. The normal concentration of platelets in the blood is 150,000 to 300,000 per cubic centimeter (Guyton, 1971, p. 136). At the site of any vessel rupture, the vessel endothelium loses its normal smoothness. As a result, platelets immediately begin to adhere to the vessel at this site. On adhering, the platelets change their characteristic structure and become irregular in shape and also become sticky to other platelets. Therefore, subsequent layers of platelets adhere to each other in layers at the vessel rupture site.

The blood clot begins to develop in 15 to 20 seconds if trauma to the vessel wall is severe, and in one to two minutes if the trauma to the vessel wall has been minor (Guyton, 1971, p. 137). Within three to six minutes after rupture of a vessel, the entire end of the vessel, or the puncture hole in the vessel wall, is filled with a clot; after 30 minutes to one hour the clot retracts (Guyton, 1971, p. 137).

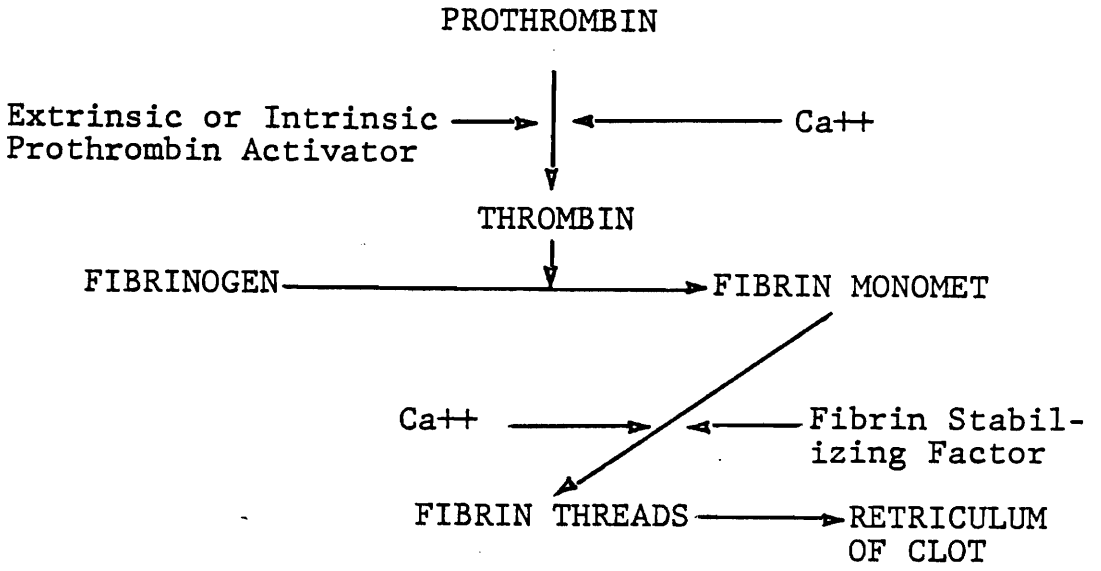

Figure 1. The mechanism of blood coagulation leading to clot formation.

Certain medications can compromise the normal blood coagulation mechanism and thus clot formation. Heparin is a mucopolysaccharide with anticoagulant effects. Heparin acts to clock the conversion of prothrombin to thrombin and the conversion of fibrinogen to fibrin (Goodman & Gilman, 1970, p. 1446). Prevention of thrombin formation is heparin's primary anticoagulant effect. After heparin administration, intravenous or subcutaneous, whole blood clotting time and thrombin times are prolonged and thromboplastin is abnormal. Intravenous heparin is often given, in doses individual

to the patient, during the catheterization procedure to prevent clot formation around the tip of the catheter and clot formation within the vessel, from trauma to the vessel wall.

Protamine sulfate is a heparin antagonist that is given at the end of the catheterization procedure to reverse the anticoagulant effects of heparin. The dosage of protamine sulfate that is administered is dependent upon the amount of heparin that was administered. Protamine sulfate is strongly basic and acts by binding with the strongly acid heparin to form a stable salt with loss of anticoagulant activity (Goodman et al., 1970, p. 1451). In this study, patients who received heparin during the catherization procedure were reversed with protamine sulfate at the end of the procedure. The usual dose of protamine sulfate is 1.0 to 1.5 milligrams for each 1.0 milligram of heparin (Goodman et al., 1970, pp. 1451). If an excessive amount of protamine sulfate is given, it can "overneutralize" the heparin and demonstrate anticoagulant properties of its own.

Conceptual Framework

Great emphasis is being put on the professional nurse to provide sound rationale to justify nursing practices. For post-catheterization patients, the

incidence of hemorrhage, as a complication, is small; but should hemorrhage occur, the possible effects are devastating (Brunwald et al., 1968; Berman et al., 1972). The nurse should have control over which nursing management regimen will follow, because she/he is directly responsible for the care of the patient when he returns to the nursing unit. In addition, the nurse's time is extremely valuable and limited. The nurse must be aware of the relationship between cost-effectiveness and the most efficient, while maintaining safety, method of post-cardiac catheterization management.

Protocol

Nursing management Method A (sandbag) and nursing management Method B (pressure) provide for a specific regimen of post-catheterization care. Method A (sandbag) involves the use of a pressure dressing and sandbag to prevent post-catheterization hemorrhage. Nursing management Method B (pressure) requires 30 minutes of digital pressure to the catheterization site to prevent hemorrhage. Table 1 briefly describes the two nursing management methods and associated advantages and disadvantages.

Table 1

Comparison of Method A and Method B

(Sandbag) Method A	(Pressure) Method B
1. Catheter removed by physician in catheterization laboratory.	1. Patient is returned to nursing unit after catheterization.
2. Digital pressure to catheterization site, applied for 15 minutes.	2. Catheter is removed on nursing unit.
3. Pressure dressing applied.	3. Digital pressure applied for 30 minutes.
4. Sandbag applied for four hours.	4. Patient is on "bed rest" until 0700 the following day.
5. Patient ambulates after six hours.	
6. Pressure dressing removed the following day.	
Advantages	Advantages
1. Patient is able to ambulate after six hours.	1. Catheterization site is always visible to observe for hemorrhage.

Table 1 (continued)

(Sandbag) Method A	(Pressure) Method B
Advantages (continued)	Advantages (continued)
2. Patient can sit up in bed and do most of personal cares.	
Disadvantages	Disadvantages
1. Catheterization site is covered. Can have much bleeding before it is visible.	1. Patient is on "bed rest" until 0700 the following day. 2. Movement of affected leg can dislodge the clot at artery puncture site. 3. Patient requires nurse assistance for personal cares, since must be flat in bed until the next morning. 4. Nurse should provide range-of-motion exercises.

CHAPTER II

DESIGN

Statement of Problem

The relative incidence of post-catheterization hemorrhage was studied in this descriptive research study to ascertain whether one method of nursing management had a lower incident of hemorrhage than the other method. Two methods of post-catherization nursing management are currently being used in a Salt Lake City critical care hospital. This study would give the nurse insight into the best way of managing post-catheterization patients. The incidence of post-catherization hemorrhage in Salt Lake City is not available. The two methods of nursing management were classified as Method A (sandbag) and Method B (pressure). The two methods were the independent variables. Hemorrhage, its presence or absence as a post-catheterization complication, was the dependent variable. Any incident of hemorrhage was recorded in connection with surrounding circumstances.

Method A (sandbag) and Method B (pressure), as described in protocol, are radically different methods of post-catheterization management. Method A (sandbag) involves the use of a pressure dressing and sandbag to

aid in initial catheterization site bloodclot formation. Method B (pressure) involves digital pressure at the femoral artery catheterization site. "Bed rest" for Method A (sandbag) patients is six hours long and continues until 7:00 a.m. the following day for Method B (pressure) patients. Distinct advantages and disadvantages occur with both nursing management methods.

A disadvantage to management Method A (sandbag) is that with the pressure dressing over the femoral puncture site, it is possible for a considerable amount of hemorrhage to occur before it is externally visible. Management Method B (pressure) has no dressing over the femoral catheterization site, so should any bleeding occur, it will be visible immediately. A disadvantage to management Method B (pressure) is that there is no dressing over the femoral catheterization site and the patient is instructed to keep the affected leg straight to avoid dislodging of the clot in the femoral artery. However, unless the patient is watched continuously, he frequently bends his leg or turns over while sleeping, thus possibly dislodging the clot at the puncture site. With management Method A (sandbag), the patient is able to ambulate early and to return to self-care, resulting in a shorter length of time of dependence on the nursing staff. The patient undergoing management Method B must remain on "bed rest" for a much greater

length of time and has a longer period of dependence on the nursing staff.

An implication for the nursing staff is that more time and care is required for the patient who has undergone management Method B (pressure) following cardiac catheterization. The patient necessitates more bedside care since he is unable to move about in bed, unable to sit up, and unable to ambulate. The patient also requires assistance in eating, by the nursing staff, since he is unable to sit up in bed. He requires assistance in voiding, since he is unable to ambulate to the bathroom. All of these additional bedside requirements demand more time and attention from the nursing staff for the patient who has undergone post-catheterization nursing management Method B.

As was stated by Schultz et al. (1976) and Ward (1975), time is money to both the hospital and the consumer-patient. Therefore, a major consideration in making nursing management decisions should be one that evaluates time or cost-effectiveness benefits. Should both nursing management methods be equal in terms of hemorrhage incidence, the method that requires the least amount of excess time on the part of the nurse is the method that should be followed in post-catheterization management.

The consequences of immobility may cause additional

problems for the patient, since the patient who has undergone management Method B (pressure) is on "bed rest" until the following day after his cadiac catheterization. The nurse is responsible for providing range-of-motion exercises to the extremities so that blood flow is not decreased during this "bed rest" period. In addition, more extensive respiratory care is required of the patient on "bed rest" than of the ambulatory patient to avoid the consequences of decreased ventilation.

Nursing care of the patient following cardiac catheterization with management Method A (sandbag) is much less involved. The patient requires less time on behalf of the nursing staff. Ambulation is possible after six hours, therefore, avoiding the hazards of immobility and the consequences of lengthy "bed rest" including assistance with voiding and with feeding.

On the basis of the difference in the amount of time required for nursing care following the two methods of post-catheterization nursing management, should the results of this study show that there is no difference in the incidence of bleeding with the two methods of nursing management, then the problem of time will be the issue and the nurse's management of this time.

Hypothesis

The hypothesis of this study was a null hypothesis.

There will be no difference in the incidence of post-catheterization hemorrhage between patients undergoing nursing management Method A (sandbag) and nursing management Method B (pressure). The literature shows no preference for either regimen of post-catheterization nursing management.

Locale

The subjects for this study were selected from a Salt Lake City, private, critical care hospital.

Methodology

This study was a descriptive design, since patient safety did not allow the use of a control group and thus an experimental or quasi-experimental design. The subjects were already classified into two groups at the hospital according to which of two methods of management were ordered by the physician. These two predetermined groups supplied the subjects for this descriptive study.

The subjects for this study were obtained from a critical care hospital and consisted of 29 post-catheterization patients. Thirteen subjects were followed with nursing management Method A (sandbag) and 16 subjects were followed with nursing management Method B (pressure).

The amount of heparin and protamine sulfate that was given during the catheterization was measured and

recorded. This was important because if bleeding occurred and heparin was given, the amount of protamine sulfate given had to be known to determine if the heparin were adequately neutralized and then if the bleeding were a result of the heparin or of the nursing management method used. In addition, it must be noted that if too much protamine sulfate were given, it might act as an anticoagulant.

Data collection began in November 1977, and continued until February 1979. The nursing management methods used in this study, as described on pages 29-30, were followed meticulously.

To maintain control over the essential time factor in both nursing management methods, the amount of time that manual pressure was maintained on the catheterization site, was noted before the pressure dressing was applied in management Method A (sandbag). The same attending physician always applied digital pressure and the pressure dressing, so the procedure did not vary between subjects. The total time that the sandbag was in place on the pressure dressing was also measured and recorded.

To maintain control following nursing management Method B (pressure), the researcher applied the digital pressure for 30 minutes on all subjects observed in this study. The researcher then observed the patient's

catheterization site at 10-15 minute intervals for two hours.

Operational Definitions

1. Post-catheterization patient: Any patient who undergoes catheterization of the femoral artery for a radiologic procedure.

2. Time: Time that manual pressure was held on the femoral catheterization site after removal of the catheter itself, was measured in minutes. Time also was used as a measure of when hemorrhage occurred in relation to how long it had been since the catheter was removed and how long it had been since manual pressure was removed from the femoral site. Time was the measurement to determine when the patient was allowed to ambulate after catheter removal. Time was an essential measurement in this study to determine the relationship between any hemorrhage that might occur and the actual cardiac catheterization procedure.

3. Hemorrhage: Any volume of blood that escaped from the femoral artery after manual pressure was released, either in the form of frank bleeding or hematoma formation. The measurements for both methods were identical, however, due to the specific steps involved in each method, these measurements were taken at times appropriate to the procedure. With nursing management

Method A (sandbag), following removal of the pressure dressing, the dressing was inspected for evidence of blood. With nursing management Method B (pressure), the skin was observed after manual pressure was removed for evidence of hemorrhage or a subcutaneous hematoma. The volume of bleeding was not the determining factor in this study, but rather, whether hemorrhage did or did not occur after catheterization following two different nursing management methods.

Exclusions

Patients were excluded from this study if they had a hemophiliac condition (or other blood dyscrasias), thrombocytopenia, and Vitamin K deficiency, or were on Coumadin therapy. These exclusions were determined from the patient's history and physical examination from his medical record. Criteria for exclusion of the patients described above was based on the interference of these factors with the body's normal clotting mechanism, ultimately lengthening the time necessary for clot formation. By allowing these patients into the study, should hemorrhage occur, it would be difficult to correlate the hemorrhage solely to the post-catheterization management method. Age, sex, or a history of hypertension were not parameters for disqualification, because these would not affect the direct relationship of

bleeding to the method of nursing management. Increased manual pressure would be needed on the hypertensive patient in order to sufficiently slow the blood flow, but this increased pressure would be used regardless of which nursing management method were used. All other patients undergoing femoral artery catheterization were eligible to be included in the subject population.

Protection of Rights and Welfare of Patients

To protect the rights and the welfare of the patients involved in this study, this proposal was reviewed by the Committees for Research on Human Subjects of both The University of Utah College of Nursing and the hospital used for data collection. The purpose of the study and implications were discussed with each patient and patients signed a Consent for Participation in Investigational Study prior to being included in the subject population. The investigator anticipated minimal risk to the subject population. All subjects were assigned a number for the purposes of analysis and evaluation to assure anonymity.

Risks and Potential Benefits

No risk was anticipated for the subjects, since the two methods of nursing management were currently in wide use and accepted as safe practice in the critical

care hospital. Since the principal investigator is a Registered Nurse, the patient received optimal direct patient care.

Limitations of Study

This study was limited by the small population (N = 29) that was observed. An important aspect of the data collection methodology used was that this observer was the only person involved in actual data collection. This insured consistency of data collection, discounted any implications that an incident of hemorrhage was due to differences in observer technique and observer judgment, and provided for investigator bias.

Data Collection

To control for extraneous variables, data collection followed the protocol describing Method A (sandbag) and Method B (pressure) meticulously. The investigator, as data collector, was a potential source of bias, since data collection involved observation. The investigator served as the agent providing the independent variables, Method A (sandbag) and Method B (pressure). Since the protocol was followed precisely, it is believed that investigator bias is at a minimum.

Subjects were grouped into Method A and Method B according to the management regimen prescribed by the physician in the acute care setting. The investigator

provided the nursing management care to the post-catheterization patients immediately upon their return to their individual units. Data were recorded on a data collection form (Appendix A).

1. Protocol for nursing management Method A: (sandbag):

a. The catheter was removed in the catheterization laboratory by the attending physician.

b. Digital pressure to the femoral artery puncture site was applied for 15 minutes.

c. A pressure dressing was applied to the femoral catheterization site after manual pressure was removed.

d. A five-pound sandbag was applied over the pressure dressing.

e. The sandbag was kept in place for four hours, then removed.

f. After an additional two hours (or six hours after the removal of the catheter) the patient was allowed to ambulate.

g. The pressure dressing remained in place for 24 hours and was then removed.

2. Protocol for nursing management Method B (pressure):

a. The patient was returned to the nursing unit following cardiac catheterization with the

catheter in place in the femoral artery.

b. The catheter was removed on the nursing unit by the physician's private nurse assistant.

c. Digital pressure was applied to the femoral puncture site for 30 minutes by a nurse who had been inserviced on the proper technique.

d. After digital pressure was terminated the catheterization site was left open to air and no dressing was applied.

e. The patient was instructed to keep his affected leg straight and not to sit up in bed.

f. The patient was maintained on "bed rest" until 0700 the following day, regardless of the time the catheterization procedure was completed.

g. At 0700 the following day, the patient could ambulate.

Data Analysis

A variety of statistical analysis tests were employed. The measurements of central tendency utilized in this study were mean, range, standard deviation, and standard error. These measurements are reflected in Tables 3 and 6 (pp. 38, 41). Statistical analysis of central tendency were used primarily to demonstrate equivalency of Groups A and B, therefore additional measurements of median and mode were not thought to be

necessary to demonstrate this equivalency.

Parametric analysis was used for comparisons, in which interval or ratio data were recorded, to compare the means of the two groups. The W test was used to determine normality of the population. The t-test was a parametric statistical analysis used for comparing two independent means. The t (pooled) statistic tests the hypothesis that the means for the two groups were equal. The t (separate) statistic tests the hypothesis that the means for the two groups were equal without the assumption of equal variance. Since there was little loss in using the separate variance t even when the pooled t may be appropriate, and since the error in using the pooled t when variances were not equal could be serious, the separate variance t was used in all applications. For the t-tests, the level of statistical significance (α) was set at .05. The Fisher Exact Probability test was used for comparing two groups with fewer than 20 subjects. This was used because the groups in this research project had less than 20 subjects.

Descriptive statistics were also utilized to demonstrate equivalency of groups in terms of age, sex, pre- and post-catheterizations blood pressures and pulse. Paired samples (t-tests) were also calculated.

Parametric analysis, t-tests, for establishing any difference between the means of Method A patients and

Method B patients were used. Specifically, separate variance estimate t-tests with two-tailed probability and Mahalanobis D^2 and Hotelling T^2, multivariate tests using all seven variables. The equivalent multivariate statistics, Hotelling's T^2 and Mahalanobis's D^2 were used to test the equality of means of seven variables simultaneously. Variables compared were: Age, pre-catheterization systolic blood pressure (SBP_1), pre-catheterization diastolic blood pressure (DBP_1), pre-catheterization pulse ($Pulse_1$), post-catheterization systolic blood pressure (SBP_2), post-catheterization diastolic blood pressure (DBP_2), and post-catheterization pulse ($Pulse_2$). In comparison of nursing management Method A subjects (Group A) and nursing management Method B subjects (Group B), the means established for each variable were used.

The t value approaches zero (0) if the null hypothesis is true. The p value described the probability of the t value occurring by random chance. The smaller the p value, the less likely the t value occurred by random chance. For the parametric analysis of the data, statistical significance (α) was set at .05.

Since the parametric tests used to test the equality of means assumed the samples came from a normally distributed population, the Shapiro and Wilk W test for normality (1965) was used to test this

assumption. The W test developed by Shapiro and Wilk (1965) was used to test each variable for normality. The W statistic is based on a ratio. If the sampling is derived from a normal population, the value of W will approach one. In non-normal populations, the value of W will approach zero as the sample comes from a more extreme non-normal population. The level of statistical significance for the W test was $\alpha = .01$. Thus a p value less than .01 indicated non-normality of the sample. A p value greater than .01 would indicate no evidence of non-normality of the sample. The W test for this study demonstrated normality of the sample.

CHAPTER III

RESULTS AND DISCUSSION

A population of 29 subjects were selected from a Salt Lake City critical care hospital to test the null hypothesis that no difference in the incidence of post-catheterization hemorrhage would occur in patients cared for with nursing management Method A (sandbag) and patients cared for with nursing management Method B (pressure). Nursing management Method A involved the use of a pressure dressing and sandbag in post-catheterization management. Nursing management Method B required 30 minutes of digital pressure in post-catheterization management. Thirteen patients were followed with nursing management Method A (sandbag) and 16 patients were followed with nursing management Method B (pressure). The youngest subject in the study was 35 years old and the oldest was 80 years old. The age range was 45 years. The mean age was 56 years, the standard deviation was 10.62. Twenty males and nine females comprised the population.

One subject in the total population showed signs of post-catheterization hemorrhage. This incident of hemorrhage occurred in a patient followed with nursing

management Method B (pressure), an incident of 1/16 = 6.25%. This incidence is significantly higher than previous studies indicate (Brunwald et al., 1968; Adams et al., 1973; Kirkpatrick et al., 1970). This high incidence can be attributed to the relatively small population observed in this study.

None of the subjects observed in this study had a history of blood dyscrasias, thrombocytopenia, Vitamin K deficiency, or were on Coumadin therapy. Hemorrhage, as a complication, followed the pattern of previous studies and was not a prevalent complication (Kerstein & Ramsby, 1973; Kirkpatrick et al., 1970). Hemorrhage can, however, occur and is a life-threatening complication.

The null hypothesis was tested because a review of the literature showed no preference for either nursing management Method A (sandbag) or nursing management Method B (pressure). The hypothesis specifically tested was: There will be no difference in the occurrence of hemorrhage between patients undergoing management Method A and management Method B.

The independent variables were: Method A (sandbag) and Method B (pressure). The dependent variables were: Hemorrhage and No-Hemorrhage. Statistical analysis was two-fold. Data were first tested to show that the two groups of subjects (Group A for nursing management Method

Table 2

Data

Variables	Sex	Age	Pre-catheterization SRP	Pre-catheterization DBP	Pre-catheterization Pulse	During Catheterization Heparin	During Catheterization Protamine Sulfate	Post-catheterization SBP	Post-catheterization DBP	Post-catheterization Pulse	Total Time Sandbag on	Time Manual Pressure	Hemorrhage
						Group A: Method A Patients (N = 13)							
1.	M	57	140	62	86	Y	Y	136	63	84	4°	0	N
2.	M	51	136	78	74	Y	Y	140	82	78	4°	0	N
3.	F	44	110	72	80	Y	Y	104	78	88	4°	0	N
4.	M	62	130	70	72	Y	Y	108	66	72	3°40'	0	N
5.	M	51	114	78	52	Y	Y	110	80	46	4°30'	0	N
6.	M	64	124	72	80	Y	Y	126	70	47	4°	0	N
7.	M	60	180	90	64	Y	Y	172	84	70	4°25'	0	N
8.	F	65	132	70	86	Y	Y	126	72	78	4°	0	N
9.	M	58	126	78	76	Y	Y	130	76	72	4°	0	N
10.	M	65	120	60	88	Y	Y	130	80	68	4°	0	N
11.	M	47	138	80	76	Y	Y	126	74	72	4°	0	N
12.	M	42	110	60	64	Y	Y	110	70	60	4°	0	N
13.	F	58	150	82	78	Y	Y	142	78	76	4°15'	0	N
						Group B: Method B Patients (N = 16)							
14.	M	54	130	78	80	N	N	136	78	78	0	30'	N
15.	F	61	114	70	64	N	N	112	68	60	0	30'	N
16.	M	67	142	80	76	N	N	140	82	72	0	30'	N
17.	F	65	150	80	96	N	N	140	90	120	0	30'	N
18.	F	41	114	70	72	N	N	120	84	84	0	30'	N
19.	F	56	144	90	72	N	N	114	76	70	0	30'	N
20.	M	65	150	80	79	N	N	140	76	72	0	30'	N
21.	M	74	136	78	74	N	N	150	86	90	0	30'	N
22.	M	36	110	70	60	N	N	120	80	68	0	30'	N
23.	M	67	130	70	80	N	N	102	64	80	0	30'	N
24.	M	56	140	70	54	N	N	102	60	46	0	30'	N
25.	F	55	86	70	64	N	N	96	60	56	0	30'	N
26.	M	35	110	80	80	N	N	100	62	84	0	30'	N
27.	M	55	175	90	76	N	N	160	84	78	0	30'	N
28.	F	52	124	76	62	N	N	110	80	72	0	30'	Y
29.	M	80	114	68	94	N	N	98	54	74	0	30'	N

A (sandbag) and Group B for nursing management Method B (pressure)) were equal, leading the observer to believe that any difference in the incidence of hemorrhage was due to the post-catheterization nursing management method implemented. Parametric statistics did show that the groups, A and B, were equal. The W test for normality showed that the sampling came from a normal population. Tests were then used to determine the statistical significance of the one incident of hemorrhage. Explanations of the tests utilized for data analysis and levels of statistical significance were discussed previously.

Table 2 presents a summary of all data collected for the subjects observed in the study. Subjects were numbered from one to 29. Information on age, sex, pre-catheterization vital signs, drugs given during catheterization, post-catheterization vital signs, and post-catheterization nursing management techniques is given. This information is the basis from which data for all statistical analysis are taken.

Central Tendency Statistical Tests

The descriptive statistics found in Tables 3, 4, 5 and 6 provide an overview of the sample population studied. The population consisted of Group A (sandbag) with 13 subjects, 10 males and three females. The

Table 3

Total Sample, Method A and Mehod B, Descriptive Statistics

		Pre-catheterization				Post-catheterization			Method A	
		Age	SBP	DBP	Pulse	SBP	DBP	Pulse	Total Time Sandbag On	Proportion Hemorrhage
Total Sample	Mean	57	130	75	74	124	74	73		
N = 29	St. Dev.	10.628	19.955	7.975	10.736	19.383	9.061	14.736		
20 Males 9 Females	St. Err.	1.974	3.706	1.481	1.994	3.599	1.683	2.736		1/29 = .0
	Min.	35	86	60	52	96	54	46		
	Max.	80	180	90	96	172	90	120		
	Range	45	94	30	44	76	36	74		
Method A Patients	Mean	56	132	73	75	128	75	70	(Range = 3.67-4.83)	
N = 13	St. Dev.	7.941	18.888	9.001	10.218	18.218	6.198	12.599		
10 Males 3 Females	St. Err.	2.203	5.239	2.497	2.834	5.053	1.719	3.494		0/13 = .0
	Min.	42	110	60	52	104	64	46	(Mean = 4.22)	
	Max.	65	180	90	88	172	84	88		
	Range	23	70	30	36	68	20	42		
									(Decimal fraction hours)	
Method B Patients	Mean	57	129	76	74	121	74	75	0	
N = 16	St. Dev.	12.607	21.607	7.038	11.394	20.394	11.051	16.292	0	
10 Males 6 Females	St. Err.	3.152	5.336	1.759	2.860	5.099	2.763	4.074	0	1/16 = .0
	Min.	35	86	68	54	96	54	46	0	
	Max.	80	175	90	96	160	90	120	0	
	Range	45	89	22	42	64	36	74	0	

Table 4

Paired or Related Samples t-Tests

	SBP_1 Mean	SBP_2 Mean	Difference	t-Value	Two-Tail Probability
Total Sample	130	124	6	2.63	.014
Method A Patients	131	128	3	1.69	.116
Method B Patients	129	121	8	2.10	.053
	DBP_1 Mean	DBP_2 Mean	Difference	t-Value	Two-Tail Probability
Total Sample	75	74	1	.30	.769
Method A Patients	73	75	-2	- .84	.419
Method B Patients	76	74	2	.93	.367
	$Pulse_1$ Mean	$Pulse_2$ Mean	Difference	t-Value	Two-Tail Probability
Total Sample	74	73	1	.72	.479
Method A Patients	75	70	5	1.65	.125
Method B Patients	74	75	-1	- .51	.616

Table 5

Tests for Difference between Means of Method A Patients and Method B Patients*

Variable	Group A Mean	Group B Mean	t-Value	p
Age	56	57	-.45	.654
SBP_1	132	129	.30	.768
DBP_1	73	76	-.99	.334
$Pulse_1$	75	74	.30	.768
SBP_2	128	121	.90	.377
DBP_2	75	74	.28	.779
$Pulse_2$	70	75	-.96	.344

Multivariate tests using all seven variables: Mahalanobis $D^2 = 1.6980$
Hottelling $T^2 = 12.1790$
$p = .276$

*Separate variance estimate t-tests with a two-tailed probability.

Table 6

Method by Sex, Descriptive Statistics

		Method A				Method B			
		Age	SBP_1	DBP_1	$Pulse_1$	Age	SBP_1	DBP_1	$Pulse_1$
MALES	Mean	56	132	73	73	59	129	76	75
	St. Dev.	7.660	19.651	9.897	10.881	14.851	20.067	6.851	11.124
	St. Err.	2.422	6.214	3.130	3.441	4.696	6.346	2.166	3.518
	Range	23	70	30	36	45	65	22	40
			SBP_2	DBP_2	$Pulse_2$		SBP_2	DBP_2	$Pulse_1$
MALES	Mean		129	75	67		125	73	74
	St. Dev.		18.861	6.931	12.405		23.232	11.472	11.793
	St. Err.		5.964	2.192	3.923		7.347	3.628	3.729
	Range		64	20	38		62	32	44
		Age	SBP_1	DBP_1	$Pulse_1$	Age	SBP_1	DBP_1	$Pulse_1$
FEMALES	Mean	56	131	75	81	55	122	76	72
	St. Dev.	10.693	20.033	6.429	4.163	8.270	23.231	8.000	12.675
	St. Err.	6.173	11.566	3.712	2.404	3.376	9.480	3.266	5.175
	Range	21	40	12	8	24	64	20	34
			SBP_2	DBP_2	$Pulse_2$		SBP_2	DBP_2	$Pulse_2$
FEMALES	Mean		124	76	81		115	76	77
	St. Dev.		19.079	3.464	6.429		14.459	10.912	23.247
	St. Err.		11.015	2.000	3.712		5.903	4.455	9.490
	Range		38	6	12		44	30	64

minimum age was 42 years and the maximum age was 65 years. The age range was 23 years. The mean was 55 years and the standard deviation was 7.941. This compares to 16 subjects in Group B. Group B (pressure) was comprised of 10 males and six females. The minimum age was 35 years. The maximum age was 80 years. The age range was 45 years. The mean was 57 years and the standard deviation was 12.607.

Table 3, Total Sample, Method A and Method B, Descriptive Statistics, provides central tendency measurements of the seven variables for the total population and individually for Groups A (sandbag) and B (pressure). The central tendency values are closely comparable indicating that the groups are equivalent.

Related samples were compared to determine equivalency of groups in Table 4. Method A (sandbag) and Method B (pressure) means for pre- and post-catheterization vital signs (Blood Pressure and Pulse) values were compared: SBP_1 and SBP_2; DBP_1 and DBP_2; $Pulse_1$ and $Pulse_2$. The t values and two-tail probabilities indicated that the two groups (Group A and Group B) are equivalent.

Table 5 describes a comparison of the means, of seven variables, from Groups A (sandbag) and B (pressure). The results of the statistical analysis demonstrated t values approaching zero and resultant p values

approaching one. The multivariate tests simultaneously compare all seven variables. In these tests, Mahalanobis D^2 and Hotelling T^2, the p value was .276. These tests would tend to lead the observer to believe that subjects were grouped by random chance and that through random chance, the subject population of the groups are equal.

Method by Sex, Descriptive Statistics, Table 6, provides central tendency values for each Group--A (sandbag) and B (pressure) -- with comparisons made between groups and between sex. As with previous statistical analysis, this test demonstrates equivalency of Groups A (sandbag) and B (pressure). A comparison of the means of the variables tested showed the values to be very similar, indicating that the groups were equivalent.

Tests for Normality

The results of the W test for the seven variables (Age, SBP_1, DBP_1, $Pulse_1$, SBP_2, DBP_2, $Pulse_2$) indicates no evidence of non-normality (Table 7). The level of statistical significance for the W test was $\alpha = .01$. Thus a p value of less than .01 indicates non-normality of the sample, and a p value greater than .01 indicates no evidence of non-normality of the sample. The W score for all seven variables was greater than .90 and the

Table 7

W Test for Normality

Variable	W	P
Age	.9737	.6876
SBP_1	.9333	.0788
DBP_1	.9304	.0664
$Pulse_1$	.9663	.4965
SBP_2	.9510	.2203
DBP_2	.9537	.2563
$Pulse_2$	.9105	.0206

p values were all greater than .01, indicating a sampling derived from a normal population. There were no variables indicating non-normality of the sample.

Fisher Exact Probability Test

Table 8, Incidence of Hemorrhage for Methods A (sandbag) and B (pressure), depicts the ultimate results of this study, indicating the one incident of hemorrhage which occurred in Group B (nursing management Method B [pressure]). The Fisher Exact Probability Test, one-tail and two-tail, statistic was applied. (The one-tail p = .5517, the two-tail p = 1.000.) The Fisher Exact Probability test was used to determine whether the two groups--Method A (sandbag) and Method B (pressure)--differ in the proportion with which they fall into the two classifications of Hemorrhage and No-Hemorrhage. Based on this sample, the test gives evidence for acceptance of the null hypothesis that the incidence of hemorrhage is equivalent for Method A (sandbag) and Method B (pressure). This is true despite the fact that the one incident of hemorrhage occurred in Group B (pressure), while no hemorrhage occurred in Group A (sandbag). Statistical probability would lead to the conclusion that a larger population would have shown equivalency of the incidence of hemorrhage.

As stated previously, time and bleeding were noted

Table 8

Incidence of Hemorrhage for Methods A and B

Hemorrhage	Method A	Method B	Total
Yes	0	1	1
No	13	15	28
Total	13	16	29

Fisher Exact Test (1-tail) p = .5517

Fisher Exact Test (2-tail) p = 1.000

in data collection. Table 2 describes the length of time manual pressure was held on the catheterization site after the catheter was removed (for Method B [pressure] subjects) and the length of time the sandbag was in place on the catheterization site (for Method A [sandbag] subjects). The one incident of hemorrhage, and circumstances surrounding that incident, will be described fully in later sections.

The statistical analysis tests performed gave results that are two-fold. The null hypothesis was accepted with no statistical significance given to the one incident of post-catheterization hemorrhage. Parametric statistic tests indicate that the hemorrhage was probably due to random chance in a normal population. Parametric statistic tests also reinforce a basic premise of this study, that the two groups--Group A (sandbag) and Group B (pressure)--are equivalent and are representative of a normal population. Tests for normality were done in order to support the use of parametric tests.

In all instances of data collection, the method of nursing management Method A (sandbag) and nursing management Method B (pressure) were followed exactly as described in the methodology section. Heparin and protamine sulfate were given intravenously to all patients in Group A (sandbag). No patients in Group B

(pressure) received heparin or protamine sulfate during the catheterization procedure. The one incident of hemorrhage that occurred in Group B (pressure) occured one hour and five minutes after manual pressure was originally released. The subject was still on "bed rest" and had not been unusually active while in bed.

The statistical findings lead the observer to believe that nursing care given to post-catheterization patients can safely be given following either nursing management Method A (sandbag) or nursing management Method B (pressure). The results of the study accept the null hypothesis that there is no difference in the incidence of post-catheterization hemorrhage following nursing management Method A (sandbag) and nursing management Method B (pressure). The null hypothesis is accepted even with the small subject population limiting this study. The findings of this study support the conclusions of previous studies that hemorrhage is a relatively uncommon, but potentially critical complication, in the general population of post-femoral artery catheterization patients (Berman et al., 1972; Adams et al., 1973; Swan, 1968). Other considerations in nursing management decisions are now significantly more important. Since both nursing management methods are equivalent, nursing management Method A (sandbag) is preferred on the basis of fewer long term patient

complications, cost-effectiveness, and decreased nursing time needed to provide for safe patient care.

Primary complications avoided with nursing management Method A are those related to immobility. The patient followed with nursing management Method B (pressure) is on "bed rest" for a longer period of time than patients followed with nursing management Method A (sandbag). As described in the protocol, the patient followed with Method A (sandbag) is on "bed rest" for six hours and the patient followed with Method B (pressure) is on "bed rest" until 7:00 a.m. the day after the catheterization procedure. This additional time can increase the chance of developing a complication of immobility, such as thrombus formation.

The nurse is presently responsible for providing indepth care to all patients in his/her charge and as a consumer, the nurse is responsible for doing his/her part to help keep hospital costs and/or consumer costs as low as possible. The nurse is, therefore, greatly concerned with cost-effectiveness implications of the nursing care provided. Benevidez (1970) stated that the average hourly wage, in a Salt Lake City critical care hospital is $6.35 for a Registered Nurse, $4.47 for a Licensed Practical Nurse, and $3.47 for a Nurse Aide. If one of these nurses must spend a minimum of 30 minutes at a patient's bedside, holding manual pressure on

a post-catheterization site, this is costing the hospital and consumer a considerable amount of money. One thoracic surgeon, following nursing management Method B (pressure), performed 97 femoral artery catheterizations in one year, involving just coronary artery angiograms (Parrish, 1970). This costs the hospital a minimum of $168.78 (all being held by a Nurse Aide) and a maximum of $308.46 (all being held by a Registered Nurse). This does not include the catheterizations done for studies other than coronary artery angiograms. This high cost to the hospital is especially significant since the nurse cannot provide any care to other patients during this 30-minute period. In addition, the nurse is needed at the bedside more frequently to aid in eating, voiding, and other personal cares. The nurse providing the post-catheterization care with nursing management Method A (sandbag) has the opportunity to work toward the goals of decreased hospital costs and quality patient care, while maintaining safe patient care practices.

The professional nurse should be the primary advocate for providing better, safer, nursing care; in addition to utilizing the latest methods of efficiently providing this nursing care. This implies that the professional nurse have access to research information and increase research utilization in daily patient care. Applying a nursing management method for post-

catheterization care that decreases the patient's potential for long term complications and gives the nurse more freedom to give necessary care to other patients is logical, cost-effective, and provides sound scientific rationale for questioning administrators and physicians.

In addition to clinical implications, this research provides insight into the theoretical importance of continual nursing research. This study documents the importance of clinically oriented research in nursing, in addition to theory oriented nursing research and this adds to the theory/scientific nursing knowledge, which is mandatory for the profession to exist. The nursing profession must be accountable for the care that is provided and an intricate part of this accountability is involved in questioning the care given by nursing professionals, to insure quality, holistic patient care. The emphasis of this research project was clinically oriented, the results of which should be utilized by the practitioners who wish to give care to the post-cardiac catheterization patient using up-to-date scientific nursing knowledge and rationale.

Clinical nursing research, lending itself to better patient care, demonstrates how standard, acceptable, nursing and medical practices must be continually reevaluated in view of new evidence influencing clinical

practice. To provide for more efficient use of nursing time and to contribute to movements toward critical evaluation of cost-containment and cost-effectiveness programs. The results of this study indicate that a change in nursing management methods can allow for better patient care and more efficient nursing time management. This study was looking at only one small aspect of nursing care, but it has shown that post-catheterization nursing care can be evaluated and improved. This implies that other aspects of nursing care must also be examined and evaluated. Examination and evaluation forces nurses to look more critically at the routine patient care they provide. The question must be asked, does the patient care given exemplify sound scientific rationale and scientific inquiry?

CHAPTER IV

SUMMARY AND RECOMMENDATIONS FOR FUTURE STUDY

Summary

This nursing research project was intended to study the incidence of post-catheterization hemorrhage following two methods of nursing management. The null hypothesis was tested, since the literature showed no preference for either nursing management method. The null hypothesis was accepted in this research project. The results of this study gave guidelines for nurses to make sound patient care judgments and insure quality patient care while maximizing cost-effectiveness and efficient time management.

This research project was done because of an intellectual curiosity about why two radically different nursing management methods were utilized for individual patient care with a potential for complications resulting from prolonged "bed rest." If the statistical probability of post-catheterization hemorrhage is equivalent following the two nursing management methods, then the nurse must make a nursing judgment about the care to be given, encourage physician cooperation, provide for further professional education, and give sound,

scientific, rational for the nurse's performance, based on nursing research.

This study was a small descriptive research project, with a sample size of 29 subjects. A subject group was compared with the variables: (1) Method A (sandbag), (2) Method B (pressure), (3) Hemorrhage, and (4) No-Hemorrhage. The small sample size was the primary limitation of this study. It was, however, a study which could contribute significantly to the general body of knowledge. The study emphasized the importance of continual evaluation of routine nursing practice in view of current trends toward more individual nursing management judgments and economic emphasis on assessment of cost-effectiveness of nursing/medical care.

To advance as a profession, nursing must provide documentation and scientific rationale supporting methods of nursing care. The nurse can no longer base nursing care judgments on the premise of habit alone. Professional nurses should be able to logically and scientifically defend practices and procedures, always providing for increased research utilization.

Recommendations for Future Study

Any research endeavor which questions current nursing practices, finds them sound according to scientific rationale or improves them according to the same

scientific rationale, is a mandatory contribution to the nursing profession.

This study could be replicated utilizing either a larger subject population (possibly demonstrating statistical significance of a higher incidence of bleeding in Method B [pressure]) or comparing a third method of post-catheterization nursing management. A study could also be done which would address the psychological considerations of the nurse-patient relationship. Specifically, the benefits derived from the intimate nurse-patient interaction during the 30-minute period when digital pressure is maintained on the catheterization site. Nursing research must continue to question, evaluate, and ultimately justify all areas of nursing practice. The professional nurse must be able to transform the rituals of nursing practice into nursing goals and procedures based on scientific rationale through research utilization. The nursing profession must be accountable to the patient-consumer and deliver safe, efficient patient care that has been critically examined by cost-effectiveness criteria.

APPENDIX A

DATA COLLECTION FORM (RESEARCH TOOL)

I. Pre-catheterization

1. Initials: Sex: Age:
2. Admission Date:
3. Diagnosis:
4. Admission Vital Signs: Blood Pressure:
   Pulse:
   Weight (pounds):
5. History:
   a. Previous cardiovascular illness:
   b. Medications:
   c. Previous surgery:
   d. Allergies:
   e. Family diseases: (inherited)
   f. Aquired diseases:

II. During Catheterization

1. Date:
2. Time procedure begun: Completed:
3. Complications:
4. Size of catheter:
5. Heparin: Time: Concentration: Amount:
6. Protamine Sulfate: Time: Amount:

III. Observation Period

1. Time returned to unit:
2. Complications:
3. Post-catheterization vital signs:

   Blood pressure: Pulse:
4. Medications:
5. Peripheral circulation: Right pedal pulse:

   Left pedal pulse:
6. Method A:
   a. Total time sandbag on:
   b. Bleeding on dressing:
   c. Hematoma:
   d. Date and time dressing removed:
7. Method B:
   a. Time manual pressure held (minutes):
   b. Blood (oozing on skin) after pressure removed:
   c. Hematoma:

APPENDIX B

CONSENT FOR PARTICIPATION IN INVESTIGATIONAL STUDY

I. Information (Method A)

1. I hereby agree to allow Carolyn Sabo, R.N., to observe me during and following my angiogram procedure. Observation will include:

   a) Observation of the angiogram procedure.
   b) Observation of the catheterization site every thirty (30) minutes for four (4) hours after my angiogram procedure.

2. I will receive no treatments that would not normally be given by the staff nurse after an angiogram procedure.

3. I understand that my involvement in the investigation will require no additional treatments by Carolyn Sabo after the angiogram procedure and observation period and that my involvement will help to improve the care of patients undergoing similar procedures.

4. This information was explained to me by _____ _____. My questions will be answered by her at any time.

5. I understand that my participation is voluntary and that I may decline to cooperate or withdraw my cooperation at any time without jeopardy to myself.

6. I will neither receive payment or be charged for my participation.

II. Consent

I have read the foregoing and my questions have been answered. I desire to participate. I give permission for information gathered in this study to be released to _____.

Date_____ Patient_____

Witness_____

I. Information (Method B)

1. I hereby agree to allow Carolyn Sabo, R.N. to administer care to me following my angiogram. The care will include the following:

   a) Holding manual pressure to the catheterization site for thirty (30) minutes after the catheter is removed.
   b) Observation of the catheterization site every fifteen to thirty (15-30) minutes for two (2) hours.

2. I will receive no treatments that would not normally be given by the staff nurse after an angiogram procedure.

3. I understand that my involvement in the investigation will require no additional treatments by Carolyn Sabo after the angiogram procedure and observation period, and that my involvement will help to improve the care of patients undergoing similar procedures.

4. This information was explained to me by _____ _____. My questions will be answered by her at any time.

5. I understand that my participation is voluntary and that I may decline to cooperate or withdraw my cooperation at any time without jeopardy to myself.

6. I will neither receive payment or be charged for my participation.

II. Consent

I have read the foregoing and my questions have been answered. I desire to participate. I give permission for information gathered in this study to be released to _____.

Date_____ Patient_____

Witness_____

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VITA

Name	Carolyn Elizabeth Sabo
Birthplace	Long Beach, California
Birthdate	September 18, 1952
Schools	Snow Elementary School Napa, California 1957-1959
	Susanville Elementary School Susanville, California 1959-1961
	Niles Elementary School Fremont, California 1961-1964
	Hopkins Junior High School Fremont, California 1964-1966
	Mission San Jose High School Fremont, California 1966-1970
Universities	University of Wyoming Laramie, Wyoming 1970-1972
	University of Utah Salt Lake City, Utah 1972-1975; 1976-1977; Spring 1979
Degree	Bachelor of Science of Nursing University of Utah 1975
License	Registered Nurse State of Utah

Professional Organizations	American Association of Critical Care Nurses
Honors and Awards	None
Professional Positions	Staff Nurse Holy Cross Hospital Salt Lake City, Utah 1975; 1976
	Head Nurse University of Utah Medical Center Salt Lake City, Utah 1977-1979
	Staff Nurse University of Utah Medical Center Salt Lake City, Utah 1979